UNITED STATES GOVERNMENT

memorandum

DATE: January 23, 1987

REPLY TO ATTN OF: Wildlife Management Biologist, FWS, Jacksonville, Florida

SUBJECT: Sambar Deer Management

TO: Refuge Manager, St. Vincent NWR

Reference our telephone conversation last week, I like your thoughts on scheduling the sambar hunt during latter October or early November. As you are aware, other researchers asked to provide comments on Steve Shea's study noted the need to develop a better data base on acorn consumption through more ruman analysis. The most meaningful data would be from ruman samples during peak acorn availability. Discussion with other biologists indicates this is around mid-October. A hunt during latter October should provide adequate samples.

Concerning whether to combine or separate the whitetail and sambar hunts, I have second thoughts on separating the harvest on the first hunt. Researchers have noted the need to analyze rumans from whitetail and sambar deer for comparison. If harvest of these species was separated, then we should nightlight some whitetails. Considering the reduced number of whitetails on St. Vincent, I prefer samples be taken from hunter harvested animals. If deemed necessary, this should not preclude holding the regular white-tailed hunt later in the season.

From a logistical standpoint, I agree it may not be feasible to schedule more than a limited sambar hunt this year. This initial hunt should provide good insight on methods of handling large animals, harvest rates, public interest, etc. for planning towards specific management objectives in 1988. I would appreciate consideration for a two-day hunt this fall, but understand your reluctance to more than a day hunt, and will support your proposal. I definitely prefer we not establish a harvest quota based on annual recruitment, as this may not be compatible with management needs over the next 3-4 years. We appear to be in agreement on this.

Hunting interest in sambar will likely exceed the safety capacity of the island, and I agree with plans to issue permits.

I am not quite sure what you should propose for the later season whitetail hunts. The whitetail population has been significantly reduced during the past two hunt seasons. Using Les Flynn's whitetail population estimate of around 365 animals in 1985, and subtracting the 1985 and 1986 hunt season harvest plus a minimal crippling loss, would leave under 200 animals. This assumes no positive recruitment to the population above natural mortality in 1986. Based on current

OPTIONAL FORM NO. 10
(REV. 1-80)
GSA FPMR (41 CFR) 101-11.6
5010-114

☆ U.S. GOVERNMENT PRINTING OFFICE : 1984 O - 421-526 (9238)

information, this seems to be a reasonable assumption. Given the suboptimum condition of deer harvested this winter, it's possible recruitment will again be reduced in 1987.

The ungulate biomass on St. Vincent could still be above carrying capacity, but it appears the whitetail population is substantially below what similar habitats support. Perhaps we should seriously question the advisability of any further reduction to the whitetail population.

With the reduction of the whitetail herd, it's possible sambar could expand their number into niches previously occupied by whitetails. Others reviewing the sambar study feel there may be more similarity in habitat use than concluded. It seems the only major dietary difference in the study data was the sambar's usage of white waterlily, and their ability to use and digest coarser browse. Some of the forage found in sambar, but not in whitetails are usually eaten by whitetails when available. Ungulate interaction on St. Vincent could potentially result in an unequal availability of particular forage species.

Shea's thesis noted "because sambar are less specialized in their food habits and have a reach advantage when browsing, they would likely have a competitive advantage over whitetails in terrestrial habitats". This dietary advantage, and similarity of food habits between the species could provide the opportunity for sambar to displace whitetails during periods of unusual stress, or substantial change in deer numbers. Considering the 1985 population estimates for both species, and carrying capacities for white-tailed deer in other areas with similar habitat to St. Vincent, it seems reasonable to question if this hasn't already been occurring.

Co-existence of sambar and white-tailed deer over the past 75 years may be partially due to hunting of both species prior to refuge establishment, and generally conservative harvest of whitetails after establishment. This may have limited the opportunity for sambar herd expansion into the most favorable whitetail habitats. I have been told the kill of sambar by island owners, guests, and trespass taking may have resulted in an annual removal of 40-50 animals.

I have discussed with Dr. Randy Davidson the results of the 1986 deer herd health check on St. Vincent. The presence of sambar deer confounds the interpretation of results. Weather patterns may also affect the Annual Parasite Count (APC) index. Basically though, the low Annual Parasite Count indicate the density of whitetails has been sufficiently reduced to interrupt the life cycle and transmittal of abomasal parasites. With an APC of 640, the whitetail herd generally would be within the carrying capacity.

The poor physical condition of whitetails noted during necropsy is indicative of inadequate forage. When one considers whitetail harvest levels during the 1985/86 hunt season and current population ratios between ungulates, it seems likely sambar were exerting sufficient foraging pressure to partially suppress the physical recovery of whitetails.

Forage values also may have been reduced with the spring and summer drought. But severe weather patterns are a normal occurrence, particularly on barrier islands. These biologically stressful cycles regulate species occurrence and numbers.

Indigenous species have evolved to survive cyclic stress. Survival is usually a delicate balance of population decline and recovery. This can be disrupted by a close niched exotic. However, if one species does not have too much competitive advantage, active management can usually sustain similar niched species in the same area. Whether this is desirable or not would be a policy decision. Other wildlife considerations may also be involved, and more information on habitat interaction is probably needed.

In the meantime, there seems to be good agreement between researchers and biologist that the current ratio of sambar and whitetails is out of balance, and specific management is needed to bring these populations in closer alignment with overall objectives. The current biological data base seems adequate to start addressing this management need. A broader data base from this fall's hunt will be helpful in developing a clear management proposal for the next 3-4 years.

Wendell Metzen

"Make Safety A Friend For Life"

R.O. Attachment to St. Vincent January 23 Subject Memo, "Sambar Management"

This is a continuation of the above subject memo. The specific purpose of the following scenario is to relate the potential importance of managing for a balanced ratio of deer as early as possible.

If the assumptions in the scenario are reasonable, it's likely the reduced whitetail herd may not adequately recover without some bonafide reduction to the sambar population. There could be a direct relationship to sambar reductions and whitetail population improvements.

At the current population estimate, an annual removal of 30-35 sambar will not likely result in any carryover reduction to the population. As will be noted in the scenario, an annual harvest of around 60 sambar over a 3-4 year period may be required to make inroads. This level of annual harvest may be controversial at the local level, but a necessity for effective management.

A better data base will be important in developing and communicating management needs. Of particular importance, is a better documentation of acorn production and ungulate use.

Barrier island economies are generally fueled by mast. Studies have shown that whitetail population dynamics on barrier islands is directly linked to acorn production. Significant use by another species for a potentially limited resource could result in limiting competition.

Also of consideration is soft mast availability to migratory birds. From casual observations during the early winter season, it seemed several of the more important soft mast producers (wax myrtle, yaupon, grape, similax, etc.) were being browsed to an extent to significantly reduce soft mast production. Most of these species were heavily browsed. The reach advantage of sambar deer, and their ability to utilize coarser browse could result in over utilization of many species of key importance to migratory birds.

SCENARIO--- is based on simplified assumptions.

When working with animal numbers of different size classes relating to carrying capacities, Animal Unit (A.U.) ratios should be considered rather than individual numbers. In this scenario one sambar deer unit is considered equal to 3 whitetail units. This is based on size differences, foraging behavior, ruman sizes, etc. The ratio is likely conservative in favor of sambar. A more direct ratio between the species using most of the above criteria would be about 1/5. For acorn consumption, the S.E. Wildlife Disease Lab estimated thise could

be as much as a 1/10 ratio difference. Generally though, a 1/5 ratio seems more realistic. I have lowered this to a 1/3 ratio to compensate for some potential separation in dietary habits between the two species.

To begin computation, population estimates are needed. The 1985 summer mean population estimates provided in Less Flynn's thesis of 180 sambar and 365 whitetails are used. With assumptions and biological insight, these estimates will be adjusted to a ballpark estimate of current populations. This is shown in the following table:

	Sambar	Whitetails
Summer 1985 pop.est.	180 (540 A.U)	365 (365 A.U.)
Recruitment[a]	+9	+73
Fall 1985 pre-hunt est.	189 (576 A.U.)	438 (438 A.U.)
85/86 hunt season kill	-7[b]	-228[c]
Summer 1986 pop.est.	182 (546 A.U.)	210 (210 A.U.)
Recruitment	+17[d]	+0[e]
Fall 1986 pre-hunt est.	199 (597 A.U.)	210 (210 A.U.)
86/87 hunt season kill	-7[b]	-60[f]
Summer 1987 pop. est.	192 (576 A.U.)	150 (150 A.U.)
Recruitment	+34[g]	+38[h]
Fall 1987 pre-hunt est.	226 (678 A.U.)	188 (188 A.U.)

Footnotes attached

As noted, the current deer populations are split into a 20/80 A.U. ratio in favor of sambar. It is assumed most everyone would prefer the Service manage to provide at least an equal, and probably a balanced advantage for the native whitetail. For computation a minimal 40/60 ratio favoring whitetails is deemed desirable.

Management of the deer herd within a 40/60 ratio would require an annual removal of about 60 sambar over a 3-4 year period. This is based on the current population estimate from the above scenario, and a 15% annual sambar recruitment rate (likely conservative estimate) after 1986.

A ballpark estimate of the deer (does not consider hogs) carrying capacity for St. Vincent is 600-700 A.U.'s. This estimate is based on the University of Georgia population estimates in 1985. Indices showed the ungulate population was exceeding carrying capacity at the time of these population estimates. Therefore, University of Georgia population estimates were reduced by 25% to provide a ballpark estimate of a manageable carrying capacity.

A carrying capacity of about 650 A.U.'s with a 40/60 ratio split of sambar-whitetails would equate to a population number of around 75 sambar and 425 whitetails.

This level of sambar reduction (60 animal removal over 3-4 years) would benefit whitetail. The whitetail herd would respond with increased productivity. Given good climate conditions, by 1991, the whitetail population should have the capacity to provide an annual harvest of around 100-120 animals (3 times general level of past harvests).

If the whitetail was the only deer on St. Vincent and hog population minimal, the herd should easily support a sustainable harvest of around 200 animals. On barrier islands, sustainable harvest is an idealized situation. In reality, harvest would likely fluctuate between a low of 100 and high of 300 animals. This option however, may not be practical.

a. Recruitment to populations was likely below average. Indices showed ungulate populations were exceeding carrying capacity. For sambar 40+ animals could have been produced, but a bare minimal recruitment (5%) is estimated. It's expected, with an overpopulated range, sambar (equivalent to production) could be pushed off St. Vincent to the mainland. Whitetail recruitment of 73 animals is based on equal sex ratio (365÷2=183 does x.4 fawn/doe survival to hunt season = 75 fawns). Considering the crowded ungulate situation in 1984/85, the .4 fawns/doe is likely an optimistic estimate. Indices indicate the deer herd health in 1985 was sub-standard.

b. Estimate of illegal kill on St. Vincent.

c. Based on known harvest of 168 animals, plus estimated 20% crippling loss (34 animals), plus 6% guess estimate of abnormal mortality (26 animals--refuge staff felt whitetail herd was in such poor condition some die-off above normal mortality occurred).

Generally, this scenario assumes most all adult deer mortality is from hunting. Though there would be some other losses, this is felt to be minimal, and generally taken into consideration in the recruitment estimates.

d. Based on drop in whitetail A.U.'s between summer 1985 est. (365 A.U.), and summer 1986 whitetail est. (210 A.U.) = 155 A.U.'s.

Assumed 2/3 of this reduction in whitetails will be filled by increased sambar recruitment over the next two years (255 A.U. x 2/3 ÷ 3 A.U. conversion = 34 animals of which 17 will be recruited in 1986, and the remaining 17 in 1987. This is likely a bare minimal estimate of recruitment. Using the minimal 3/1 A.U. ratio, perhaps all of the above whitetail vacancies should have been considered to be filled by sambar.

It's assumed that sambar production is more stable on St. Vincent than whitetail production. Majority of sambar production (perhaps mostly 1 and 2 year age class) may move off St. Vincent to mainland when populations are above carrying capacity. If whitetail population should drop substantially, the vacancy could be partially filled through sambar recruitment (reduced movement off island). It is general knowledge there is some movement of sambar from the island. Its also rumored that sambar are generally short lived once reaching the mainland.

c. Indices indicate there was little to no positive recruitment to population. Minimum number of fawns would have been added, but it's felt their number did not exceed natural mortality to adult animals which was probably higher than normal.

f. 1986/87 hunt season harvest plus estimates crippling loss.

g. Recruitment of 17 animals discussed under (d), plus recruitment of 17 animals from 1987 production = 34 sambar.